(12) UK Patent Application (19) GB (11) 2 196 766 (13) A

(43) Application published 5 May 1988

(21) Application No 8624465

(22) Date of filing 13 Oct 1986

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(51) INT CL⁴
H04B 7/00 5/00 9/00

(52) Domestic classification (Edition J):
G4H 13D 14G 1A 60 NP
U1S 1739 G4H

(56) Documents cited
GB A 2151870 EP A2 0179283 EP A1 0054582
GB A 2121651 EP A2 0176354 EP A1 0034859
GB A 2087614 EP 0148458 WO A1 83/04327
GB 1424379
Radio & Electronic Engineer, Vol 54 No 10, October 1984, pages 424–430

(58) Field of search
G4H
H4L
H4B
H4P
Selected US specifications from IPC sub-classes G06F
H04B

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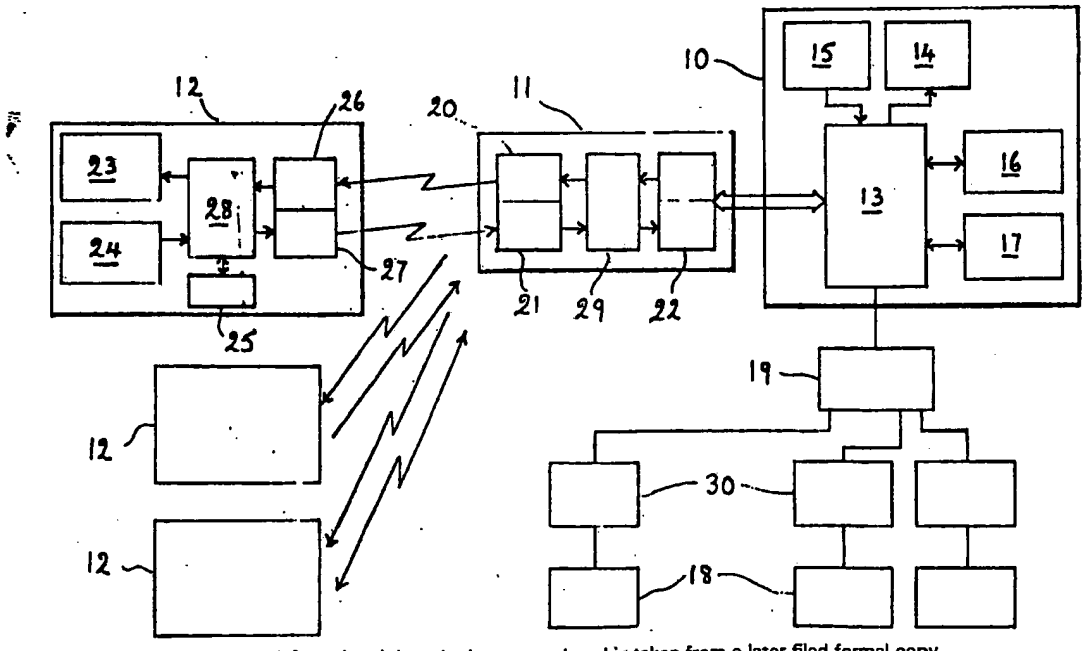
(54) Computer communication system

(57) A computer system for use in a restaurant environment is described. The system comprises a central computer 10 provided with a communication module to enable communication between the central computer and a plurality of remote handheld computers 12. The handheld computers are used by waiters to enter customers orders which are then transmitted by radio or infra-red radiation to the communication module 11. Data concerning menus and available dishes may be transmitted from the central computer 10 to the remote computers. Preferably, in order to prevent collisions in the communication channel, the remote computers are interrogated in turn by the central computer.



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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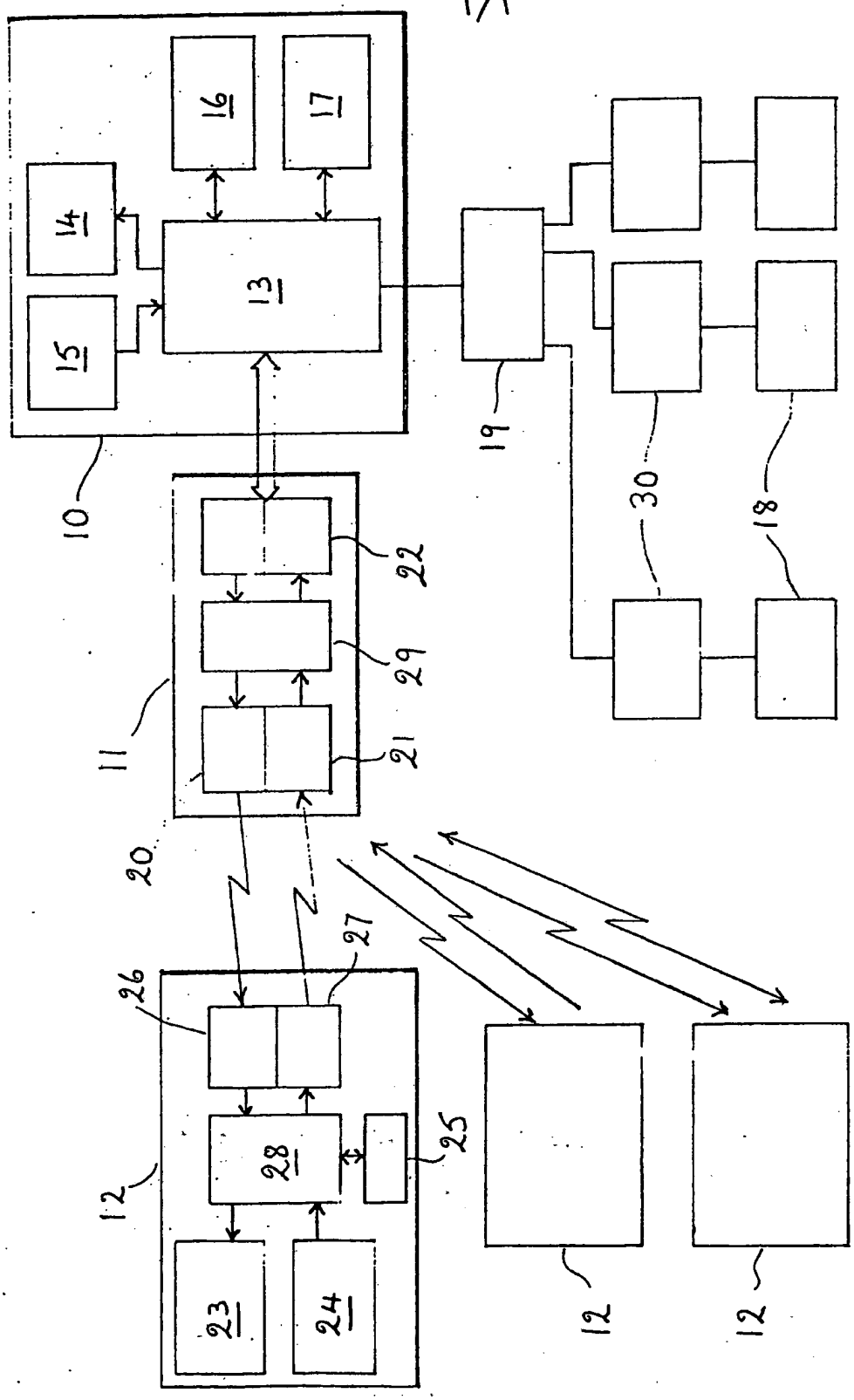

SPECIFICATION

Computer communication system

This invention relates to a computer communication system for communication between one or more portable or hand held computer devices and a central computer.

It is known to provide a plurality of so-called dumb terminals at remote locations from a central computer for the logging or retrieval of data and to connect such terminals to the central computer by means of cables. The need for connections by means of cables results in the terminals being restricted to fixed locations and they are not readily portable. Also it is known to connect a plurality of computing units together in a network by means of interconnecting cables. However such interconnected systems generally are permanently connected and hence are relatively inflexible. In order to provide greater flexibility, portable computer units have been provided with an interface for linking with the public telephone network to enable such units to communicate with other computers connected to the telephone network. It will be appreciated that all the systems referred to above are dependent for communication upon a cable connection and hence there are restrictions on where such systems can be used.

There are situations where it would be convenient to have portable computer units in communication with a central computer. For example, in a restaurant it would be convenient to provide each waiter with a portable computer unit for the remote entry of customer orders and to use this unit to communicate with a central computer for the processing of the order. However in such a situation the present need to provide cable connections between a portable unit and a central unit renders the use of such a system impractical.

According to the present invention a computer communication system includes a central computer unit provided with communication means operable to receive and transmit data by radiation signals from and to one or more remote units.

In order to avoid contention between the remote units it is preferred to arrange the communication means to be operative to transmit an interrogation signal addressed to each remote unit in turn and each remote unit to be rendered operative by receipt of the interrogation signal addressed to that unit to transmit data from that remote unit to the communication means.

The communication means may be operative after data transfer from an addressed one of the remote units to transmit an interrogation signal to another of said remote units.

Also the communication means may be operative after elapse of a predetermined time from transmission of the interrogation signal addressed to one of the remote units to transmit the interrogation signal addressed to another of the remote units.

Preferably the communication means is operable to transmit data to an addressed one of the remote units.

The communication means may comprise a radiation transmitter; a radiation receiver; an input buffer store; an output buffer store and means controlling transfer of data from the input buffer store to the transmitter and from the receiver to the output buffer store.

A computer communication system embodying the present invention will now be described with reference to the drawing.

Referring to the drawing, a central computer unit 10 is provided with a communications processor 11 for communication with one or more hand held computer units 12. The central computer unit 10 may be a personal computer consisting of a data processing unit 13, display monitor 14 and keyboard 15 together with disc data storage such as a hard disc store 16 and floppy disc store 17. A number of data output devices such as printers 18 may be connected to the central computer unit by means of a software controlled switch 19. Preferably a data buffer 30 is provided for each printer to permit data to be output by the central computer unit 10 in blocks to each of the printers.

The communications processor 11 is connected to an input/output port of the central computer unit 10. The processor 11 includes a transmitter 20, a receiver 21 and a buffer store 22 interconnected by means of a data bus. The buffer store 22 has a first section for receiving data from the port of the central computer unit 10 and a second section for sending data to the port of the central computer unit 10. Preferably both sections operate in a first in first out mode but if desired other modes may be used. A microprocessor 29 controls transfer of data via the bus from the first section of the buffer store to the transmitter and from the receiver to the second section of the buffer store. The transmitter 20 and receiver 21 operate at radio frequency preferably in the UHF range. Alternatively, instead of operating at radio frequency, they may operate in the infra-red band.

Each hand held computer unit 12 includes a microprocessor 28 together with an alphanumeric display 23, a keyboard 24 and a random access memory 25. In order to enable the unit to be small in size, the display is implemented by a liquid crystal device. A receiver 26 and a transmitter 27 are connected to an input/output port of the data processor 28. The receiver 26 and transmitter 27 operate in the same radiation range as the transmitter 20 and receiver 21. Data may be input to the data processor 28 by means of the keyboard 24 and the entered data is then

displayed on the alphanumeric display 23. This data may then be written into the memory 25.

The transmitters and receivers in the handheld computer units and the receiver and transmitter in the communications processor enable the transmission of data in both directions between the central computer unit and each of the handheld computer units. The receivers 26 of all the remote units 12 operate at the same frequency as the transmitter 20 of the communications processor 11 and the transmitters 27 of all the remote units 12 operate at the same frequency as the receiver 21 of the communications processor 11. The transmitter 20 and receiver 21 may operate at different frequencies. However, as will be explained hereinafter, the remote units do not initiate transmission but only transmit in response to an interrogation signal from the communications processor and therefore the transmitter 20 and receiver 21 may operate at the same frequency.

It will be appreciated that since it is intended that the system should include a plurality of remote hand held computer units, it is possible that more than one of the units may wish to communicate with the central computer unit at the same time. Accordingly to avoid contention between the remote units, communication from the remote units to the central computer unit and in the reverse direction is controlled by the central computer unit. This is achieved by the central computer unit transmitting an interrogation signal which includes an address of one of the remote units and upon receipt of this signal by the addressed remote unit this unit responds by transmitting data stored in its memory 25 to the central computer unit via the communications processor 11. The other remote units also receive this interrogation signal but because the address in the signal does not correspond to these other remote units they do not respond to it. After transfer of data from the addressed remote unit the communications processor interrogates another of the remote units in a similar manner. This sequence is repeated so that all the remote units are repeatedly interrogated in turn. Thus each remote unit reads data out from its store when it is addressed by an interrogation signal from the central computer unit but is unable to initiate transmission of such data to the central computer unit. It will be appreciated that at the time of its interrogation, a remote unit may not have any data to transmit or the remote unit may be inoperative. Therefore the communications processor is arranged so that if a response from an addressed remote unit has not been received by the end of a predetermined time limit the communications processor interrogates the next remote unit. It may also be desired to transmit data from the central computer unit to the remote units via the communications processor. This is accomplished by transmitting the data together with the address of the unit intended to receive the data. The addressed remote unit recognises the address and operates to write the received data into its store 25 from where it may be read and displayed by the display 23 by keying in an appropriate instruction on the keyboard 24.

The system described above is particularly useful, for example, in a restaurant environment and may be used as follows. Information such as the menu of food items available for the day may be input by means of the keyboard 15 into the central computer unit where it is displayed on the display 14. This data may then be written into memory of the central computer and output to the communications processor 11 where it is held in the first section of the buffer store 22 for transmission to the remote units. A specific remote unit can be loaded with this data by keying in an appropriate command on its keyboard 24. The data is transmitted from the communications processor and is then written into the store 25 of this remote unit.

A waiter enters customers orders into his remote unit by means of the keyboard and this data is displayed on the display 23 to enable a visual check that the data entry is correct. He is also able to key in an instruction to read data previously written into the store, from the central computer unit via the communications processor, and display this data, for example, to check the availability of items. The customer orders entered into the remote unit are then written into the store 25. Each remote unit is interrogated in turn as described above by the communications processor and if the remote unit being addressed has data in its store 25 for transmission to the central computer unit, it operates its transmitter to transmit the data to the communications processor 11 where it is held in the buffer store. Data held in the buffer store is read out, in the order in which it is received, by the central computer unit and is written to store for example to the floppy or hard disc units. This data relating to a customer order is output to a selected one of the printers 18. These printers may conveniently be situated in the kitchen, the bar and the accounts department. Thus that portion of the order relating to food items will be output to the printer in the kitchen while the portion relating to drinks will be output to the printer in the bar. This provides the kitchen and the bar with a printout of the customer's requirements. At the end of a meal when the customer is leaving the restaurant, the customer identification such as the table number is input to the central computer unit by means of the keyboard 24 on the remote unit or the keyboard 15 of the central computer unit with a command for the central computer unit to carry out an accounting operation. Data relat-

ing to the customer's account is output to the printer in the accounting department to produce a bill for the customer.

The term radiation signals used in this specification is intended to mean signals which do not require a cable or similar connection between the remote units and the communications processor. Such radiation signals may for example be radio or infra-red and may also be signals transmitted by inductive coupling between the remote units and the communications processor.

CLAIMS

1. A computer communication system including a central computer unit provided with communication means operable to receive and transmit data by radiation signals from and to one or more portable remote units.

2. A computer communication system as claimed in claim 1 in which the communication means is operative to transmit an interrogation signal addressed to each remote unit in turn and in which each remote unit is rendered operative by receipt of the interrogation signal addressed to that unit to transmit data from that remote unit to the communication means.

3. A computer communication system as claimed in claim 2 in which the communication means is operative after data transfer from an addressed one of the remote units to transmit an interrogation signal to another of said remote units.

4. A computer communication system as claimed in claim 2 in which the communication means is operative after elapse of a predetermined time from transmission of the interrogation signal addressed to one of the remote units to transmit the interrogation signal addressed to another of the remote units.

5. A computer communication system as claimed in any preceding claim in which the communication means is operable to transmit data to an addressed one of the remote units.

6. A computer communication system as claimed in any preceding claim in which the communication means comprises a radiation transmitter; a radiation receiver; an input buffer store; an output buffer store and means controlling transfer of data from the input buffer store to the transmitter and from the receiver to the output buffer store.

7. A computer communication system as claimed in any preceding claim in which the or each remote unit comprises a data processor; a keyboard; a visual display; a memory; a radiation transmitter and a radiation receiver.

8. A computer communication system as claimed in any preceding claim in which the radiation signals are at radio frequency.

9. A computer communication system as claimed in any one of claims 1 to 7 in which the radiation signals are in the infra-red band.

10. A computer communication system as claimed in any preceding claim in which the central computer unit includes a data processing device; a keyboard; a visiual display unit; data storage means and an interface for transfer of data to and from the communication means.

11. A computer communication system constructed and arranged to operate substantially as hereinbefore described with reference to the drawing.

Published 1988 at The Patent Office, State House, 66/71 High Holborn, London WC1R 4TP. Further copies may be obtained from The Patent Office, Sales Branch, St Mary Cray, Orpington, Kent BR5 3RD. Printed by Burgess & Son (Abingdon) Ltd. Con. 1/87.